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JOHN BRUCKNER, P.C.
P.O. BOX 490
FLAGSTAFF, AZ 86002

EXAMINER	
VLAHOS, SOPHIA	
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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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Office Action Summary	Application No. 10/726,475	Applicant(s) SMITH ET AL.	
	Examiner SOPHIA VLAHOS	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2003*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-33* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *05 July 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/17/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: paragraph [0017] of the Patent Application Publication of 10/726,475 the emphasized part should be updated: "...The entire contents of U.S. patent application **Ser. No. 10/__/__,** (attorney docket number UBAT1420 also known as 2500949.991420) filed Dec. 3, 2003 are hereby expressly incorporated by reference herein for all purposes."

Appropriate correction is required.

Drawings

2. The drawings are objected to because Fig 3 includes the label "D_2MODULATOR/DESPREADER" (without the quotes) that should be "DEMODULATOR/DESPREADER".

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Specifically, claim 1, recites: “...individually spread-spectrum modulating at least two of a set of orthogonal frequency division multiplexed carriers, wherein the resulting individually spread-spectrum modulated at least two of a set of orthogonal frequency division multiplexed carriers are substantially mutually orthogonal with respect to both frequency division multiplexing and spread-spectrum modulation.”

Claim 1 is a single means claim (only a single step, a modulating step is mentioned) i.e., where a means recitation does not appear in combination with another recited element of means, is subject to an undue breadth rejection under 35 U.S.C. 112, first paragraph. In re Hyatt, 708 F.2d 712, 714-715, 218 USPQ 195, 197 (Fed. Cir. 1983) (A single means claim which covered every conceivable means for achieving the stated purpose was held nonenabling for the scope of the claim because the specification disclosed at most only those means known to the inventor.).

Dependent claims 1-10 are also rejected since they contain all of the limitations of independent claim 1.

With respect to claim 12, claim 12 recites: "individually spread-spectrum demodulating at least two of a set of individually spread-spectrum modulated orthogonal frequency division multiplexed carriers that are substantially mutually orthogonal with respect to both frequency division multiplexing and spread-spectrum modulation."

Claim 12 is a single means claim (only a single step, a demodulating step is mentioned) and is therefore rejected under the same rationale as claim 1 above.

Dependent claims 13-20 are also rejected since they contain all of the limitations of independent claim 12.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-2, 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Mottier (U.S. 2006/0029012).

With respect to claim 1, individually spread-spectrum modulating at least two of a set of orthogonal frequency division multiplexed carriers (see Fig. 1, two of mixers 20, 21, 2N-1 (for example the first two "branches" of the transmitter), modulating the individual ofdm set of carriers f_c, f_c+F_b/T_b, $F_c+(N-1)F/T_b$ with the corresponding spread data of each branch (in each branch individual spreading/ modulation takes place) see paragraph [0003]) wherein the resulting individually spread-spectrum modulated at least two of a set of orthogonal frequency division multiplexed carriers are substantially mutually orthogonal with respect to both frequency division multiplexing and spread-spectrum modulation (see paragraphs [0002] and [0003] where the MC-CDMA combines the OFDM (i.e. orthogonal carriers) and CDMA techniques, also paragraph [0003] the spacing of the carriers also indicates orthogonal (non-interfering) carriers, paragraphs [0034]-[0039] (see also Fig. 1, Fig. 2), where the Walsh-Hadamard codes for example $C^{(1)} = (+1, +1, +1, +1, +1, +1, +1, +1)$, $C^{(2)} =(+1, -1, +1, -1, +1, -1, +1, -1)$, $C^{(3)}=(+1, +1, -1, -1, +1, +1, -1, -1)$ used in mixers 10,11, 1N-1 of Fig. 1 are orthogonal (this is also mentioned in paragraph [0013] orthogonality of Walsh codes).

With respect to claim 2, all of the limitations of claim 2, are analyzed above in claim 1, and Mottier et.al., discloses: further comprising individually spread-spectrum modulating at least two of another set of orthogonal frequency division multiplexed carriers (see Fig 1 gain, another pair (not shown) of the branches), wherein the resulting individually spread-spectrum modulated at least two of the another set of orthogonal frequency division multiplexed carriers are substantially mutually orthogonal with respect to both frequency division multiplexing and spread-spectrum modulation (see paragraphs [0002] and [0003] where the MC-CDMA combines the OFDM (i.e. orthogonal carriers) and CDMA techniques, also paragraph [0003] the spacing of the carriers also indicates orthogonal (non-interfering) carriers, paragraphs [0034]-[0039] (see also Fig. 1, Fig. 2) and $C^{(3)}$=(+1, +1, -1, -1, +1, +1, -1, -1) and the remainder spreading codes for the branches are also walsh codes (i.e. mutually orthogonal) used in mixers 10,11, 1N-1 of Fig. 1 are orthogonal (this is also mentioned in paragraph [0013] orthogonality of Walsh codes).

With respect to claim 5, all of the limitations of claim 5, are analyzed above in claim 1, and Mottier et. al., disclose: wherein spread-spectrum modulating includes direct-sequence spreading using a fully orthogonal Walsh polynomial code set (see [0034]-[0038] where the Walsh-Hadamard codes for example $C^{(1)}$ = (+1, +1, +1, +1, +1, +1, +1, +1), $C^{(2)}$ =(+1, -1, +1, -1, +1, -1, +1, -1), $C^{(3)}$=(+1, +1, -1, -1, +1, +1, -1, -1)

where Walsh-Hadamard codes are derived from the Hadamard matrix that includes polynomials).

7. Claims 1-2, 5, 7-9, 12-13, 16, 18-19, 22, 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Hara et. al. "Overview of Multicarrier CDMA", IEEE, 1997.

With respect to claim 1, Hara et. al., disclose: individually spread-spectrum modulating at least two of a set of orthogonal frequency division multiplexed carriers (Fig. 2(a) function of each one of the second mixers on the "branches" (two top branches for example) of the transmitter, where the frequencies f1,f2, fGMC are mutually orthogonal, as shown in Fig2(b), and the first mixers spread-spectrum modulate the respective carriers, and see that the branches (and therefore carrier frequencies used in the respective branches are (arbitrarily) considered as sets (pairs of two carrier frequencies corresponding to the c1j and c2j (c3j and c4j and so on based on the vertical plot (on the top left part of Fig. 2) of the speeding codes)), wherein the resulting individually spread-spectrum modulated at least two of a set of orthogonal frequency division multiplexed carriers are substantially mutually orthogonal with respect to both frequency division multiplexing and spread-spectrum modulation (see Fig, 2(b), the carrier frequencies are mutually orthogonal, and see that the spreading codes of the first mixers (C1j,C2j) are hadamard walsh codes (mutually orthogonal codes) (see first two paragraphs of section "combination of frequency domain spreading and multicarrier modulation MC-CDMA scheme")).

With respect to claim 2, all of the limitations of claim 2 are analyzed above in claim 1,and Hara et. al., disclose: further comprising individually spread-spectrum modulating at least two of another set (Fig.2(a) the pair (set) of f3 and f4 carrier frequencies for example, correspond to the c3j and c4j spreading codes (set) as mentioned above in claim 1) of orthogonal frequency division multiplexed carriers, wherein the resulting individually spread-spectrum modulated at least two of the another set of orthogonal frequency division multiplexed carriers are substantially mutually orthogonal with respect to both frequency division multiplexing and spread-spectrum modulation (see Fig, 2(b), the carrier frequencies are mutually orthogonal, and see that the spreading codes of the first mixers (C1j,C2j)are hadamard gold codes (mutually orthogonal codes) (see first two paragraphs of section "combination of frequency domain spreading and multicarrier modulation MC-CDMA scheme).

With respect to claim 5, all of the limitations of claim 5, are analyzed above in claim 1, and Hara et. al., disclose: wherein spread-spectrum modulating includes direct-sequence spreading using a fully orthogonal Walsh polynomial code set (page 127, left column, last three lines the mentioned Hadamard Walsh (fully) orthogonal codes).

With respect to claim 7, all of the limitations of claim 7, are analyzed above in claim 1, and Hara et. al., disclose: further comprising modulating at least one of the individually spread-spectrum modulated orthogonal frequency division multiplexed carriers using at least one modulation technique selected from the group consisting of

BPSK, QPSK, OQPSK, MSK, and n-QAM (see first paragraph on right column of page 127, the mentioned CBPSK (modulation) scheme used in the transmitter).

With respect to claim 8, all of the limitations of claim 8, are analyzed above in claim 1, and Hara et. al., disclose: spread-spectrum demodulating at least two of the set of individually spread-spectrum modulated orthogonal frequency division multiplexed carriers (see Fig. 2(c) second mixers on each receiving branch (the two top branches) demodulating the respective received signals).

With respect to claim 9, all of the limitations of claim 8, are analyzed above in claim 1, and Hara et. al., disclose: spread-spectrum demodulating at least two of the set of individually spread-spectrum modulated orthogonal frequency division multiplexed carriers (see Fig.2 (c) receiver structure, mixers of each branch (two top branches) demultiplex the received signal (i.e. the individually spread-spectrum modulated orthogonal frequency division multiplexed carriers) with respective carrier frequencies).

With respect to claim 12, Hara et. al., disclose: individually spread-spectrum demodulating at least two of a set of individually spread-spectrum modulated orthogonal frequency division multiplexed carriers that are substantially mutually orthogonal with respect to both frequency division multiplexing and spread-spectrum modulation (see Fig. 2(c), receiver structure, demodulation performed by the two mixers on each receiving branch (the set arbitrarily includes two branches corresponding to the cj1 and

C2j pair shown on the top left side of Fig. 2) , of the signal transmitted by the transmitter shown in Fig 2(a) and described under section ""combination of frequency domain spreading and multicarrier modulation MC-CDMA scheme" on page 127, that uses orthogonal carriers spreading codes are Hadamard-Walsh same as the one used at the transmitter (this is a principle of operation of the CDMA transmitter/receiver using the corresponding spreading codes at the transmitter and receiver so that the spread datais recovered)).

With respect to claim 13, further comprising individually spread-spectrum demodulating at least two of another set of individually spread-spectrum modulated orthogonal frequency division multiplexed carriers that are substantially mutually orthogonal with respect to both frequency division multiplexing and spread-spectrum modulation (see Fig. 4 (c) again, where the another set corresponds to the third and fourth branch of the receiver associated with the C3j and C4j codes and f3 and f4 carrier frequencies).

With respect to claim 16, all of the limitations of claim 16, are analyzed above in claim 12, and Hara et. al. disclose: wherein spread-spectrum demodulating includes direct-sequence despreading using a fully orthogonal Walsh polynomial code set (function of receiver shown in Fig. 2(c) "undoes" the mixing and spreading performed in the transmitter where Hadamard Walsh codes are used, see last paragraph on left column of page 127).

With respect to claim 18, all of the limitations of claim 18 are analyzed above in claim 12, and Hara et. al., disclose: further comprising demodulating at least one of the individually spread-spectrum modulated orthogonal frequency division multiplexed carriers using at least one modulation technique selected from the group consisting of BPSK, QPSK, OQPSK, MSK, and n-QAM (see first paragraph on right column of page 127, where the MC-CDMA transmitter (for CBPSK) and receiver are shown in Fig. 2, therefore the function of the receiver shown in Fig 2(c) is to demodulate the CBPRK data sent from the transmitter).

With respect to claim 19, all of the limitations of claim 19, are analyzed above in claim 12, and Hara et. al., disclose: further comprising orthogonal frequency division demultiplexing the demodulated individually spread-spectrum modulated orthogonal frequency division multiplexed carriers (see Fig. 2(c), demodulated signals on each branch are mixed by second mixer by the corresponding carrier frequency).

With respect to claim 22, Hara discloses: a plurality of orthogonal frequency division multiplex generators (see Fig. 2 generated frequencies f_1 through f_{GMC} of transmitter shown in Fig. 2(a)(see orthogonality of the frequencies shown in the power spectrum of Fig. 2(b)); a plurality of data modulators, each of the plurality of data modulators coupled to one of the plurality of orthogonal frequency division multiplex generators (see Fig. 2(a) transmitter, see mixers on each branch coupled to the output

of the frequency generators (i.e. the frequencies f_1 through f_{GMC}); and a linear summer coupled to the plurality of data modulators (Fig.2(a) summation block coupled to the data modulators (mixers)).

With respect to claim 27, Hara discloses: a plurality of demodulator/despreader circuits (see Fig. 2(c) see the two mixers (one first demodulates and the second one despreads) on each "branch" associated with a respective carrier frequency and spreading code, (page 127, right column first whole paragraph); and a plurality of low-pass filters(see Fig 2 (c) LPF on each "branch" of the receiver), each of the plurality of low-pass filters coupled to one of the plurality of demodulator/despreader circuits (shown in Fig. 2(c)).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 3, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et. al. "Overview of Multicarrier CDMA", IEEE in view of Finkelstein (U.S. 6,014,446).

With respect to claim 3, all of the limitations of claim 3, are analyzed above in claim 1, except for: wherein spread-spectrum modulating includes direct-sequence spreading using a pseudorandom maximal linear sequence.

In the same field of endeavor, Finkelstein discloses: spread-spectrum modulating includes direct-sequence spreading using a pseudorandom maximal linear sequence (see column 1, lines 41-45 where the spread-spectrum modulation takes place at the transmitter by the XOR operation between the information and the PN signal, and column 1, lines 46-62 mentioning generation of maximal length PN signals (codes)).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the method of Hara et. al. (that uses Walsh-hadamard codes) so that its spread spectrum modulating includes direct-sequence spreading using a pseudorandom maximal linear sequence as taught by Finkelstein not only to provide signal protection/encryption (by spreading the information with a pseudorandom maximal linear sequence) but also use a simple generator to generate these sequences (i.e. these are easily generatable sequences) (see Finkelstein column 1,lines 36-40, 46-63).

With respect to claim 14, all of the limitations of claim 14 are analyzed above in claim 12, but Hara et. al., does not expressly teach: wherein spread-spectrum demodulating includes direct-sequence despreading using a pseudorandom maximal linear sequence.

In the same field of endeavor, Finkelstein discloses: direct-sequence despreading direct-sequence spreading using a pseudorandom maximal linear sequence (see column 1, lines 41-45, where the spread-spectrum de-modulation takes place at the receiver undoing the corresponding process at the transmitter column 1, lines 46-62 mentioning generation of maximal length PN signals (codes).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the method of Hara et. al. (that also uses Walsh-hadamard codes in the receiver to undo the corresponding Wlash Hadamard spreading preformed at the trnansmitter) so that its spread spectrum demodulating includes direct-sequence spreading using a pseudorandom maximal linear sequence as taught by Finkelstein not only to provide signal protection/encryption (by spreading the information with a pseudorandom maximal linear sequence) but also use a simple generator to generate these sequences (i.e. these are easily generatable sequences) (see Finkelstein column 1,lines 36-40, 46-63).

10. Claims 4 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et. al. "Overview of Multicarrier CDMA", IEEE in view of Dinan et. al. "Spreading Codes for Direct Sequence CDMA and Wideband CDMA cellular Networks", IEEE 1998.

With respect to claim 4, all of the limitations of claim 4, are analyzed above in claim 1, but Hara et. al. do not expressly teach: wherein spread-spectrum modulating includes direct-sequence spreading using at least one code selected from the group

consisting of a Gold code derived from combinations of a plurality of maximal linear sequence polynomials and a Kasami code derived from combinations of a plurality of maximal linear sequence polynomials.

In the same field of endeavor, Dinan et. al., disclose: includes direct-sequence spreading using at least one code selected from the group consisting of a Gold code derived from combinations of a plurality of maximal linear sequence polynomials (see Fig. 1 DS-CDMA transceiver, mixer (where spreading of the data takes place) and the PN code generator), left column of page 48, last paragraph generally talking about the spreading of the data by a spreading (PN shown as an example) code in a DS-CDMA system, see also page 50-51, section Gold sequences and page 51, second paragraph, see generation of Gold codes, (maximal linear sequence polynomials)) and a Kasami code derived from combinations of a plurality of maximal linear sequence polynomials (see page 51-52, section Kasami Sequences, and on page 5 left column first paragraph it is mentioned that a procedure (maximal linear sequence polynomials) similar to the gold code generation is used to generated the small set of Kasami sequences).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the method of Hara et. al., based on the teachings of Dinan et. al., ie the spread-spectrum modulating to include direct-sequence spreading using at least one code selected from the group consisting of a Gold code derived from combinations of a plurality of maximal linear sequence polynomials and a Kasami code derived from combinations of a plurality of maximal linear sequence polynomials, as taught by Dinan et. al., and the benefit of the above modification includes improvement of the cross

correlation properties of the codes (this applies to the use of the Gold codes see last paragraph on left column on page 51 of the Gold sequence section) and very low-cross correlation among the codes (when using the Kasami codes, see first two sentences of section Kasami sequences on page 51).

With respect to claim 15, all of the limitations of claim 15 are analyzed above in claim 12, but Hara et. al. do not expressly teach: wherein spread-spectrum demodulating includes direct-sequence despreading using at least one code selected from the group consisting of a Gold code derived from combinations of a plurality of maximal linear sequence polynomials and a Kasami code derived from combinations of a plurality of maximal linear sequence polynomials.

In the same field of endeavor, Dinan et. al., disclose: includes direct-sequence despreading using at least one code selected from the group consisting of a Gold code derived from combinations of a plurality of maximal linear sequence polynomials (see Fig. 1 DS-CDMA transceiver, mixer (where despreading of the data takes place) and the PN code generator),see right column of page 48, item 2. discussing the function of the receiver – dispreading of the received signal using the same PN code used at the transmitter (PN shown as an example), see also page 50-51, section Gold sequences and page 51, second paragraph, see generation of Gold codes, (maximal linear sequence polynomials)) and a Kasami code derived from combinations of a plurality of maximal linear sequence polynomials (see page 51-52, section Kasami Sequences, and on page 5 left column first paragraph it is mentioned that a procedure (maximal

linear sequence polynomials) similar to the gold code generation is used to generated the small set of Kasami sequences).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the method of Hara et. al., based on the teachings of Dinan et. al., i.e the spread-spectrum demodulating to include direct-sequence despreading using at least one code selected from the group consisting of a Gold code derived from combinations of a plurality of maximal linear sequence polynomials and a Kasami code derived from combinations of a plurality of maximal linear sequence polynomials, as taught by Dinan et. al., and the benefit of the above modification includes improvement of the cross correlation properties of the codes (this applies to the use of the Gold codes see last paragraph on left column on page 51 of the Gold sequence section) and very low-cross correlation among the codes (when using the Kasami codes, see first two sentences of section Kasami sequences on page 51).

11. Claims 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et. al. "Overview of Multicarrier CDMA", IEEE in view of Chang et. al. "Wavelet-Based Multicarrier CDMA for personal communications system", IEEE 1996.

With respect to claim 6, all of the limitations of claim 6, are analyzed above in claim 1, but Hara et. al. do not expressly teach: spread-spectrum modulated by at least one member selected from the group consisting of mutually orthogonal Fourier codes and mutually orthogonal wavelet codes.

In the same field of endeavor, Chang et. al. disclose: spread-spectrum modulated by at least one member selected from the group consisting of mutually orthogonal Fourier codes and mutually orthogonal wavelet codes (see page 1443, see section 2. see orthogonal set of daughter wavelets, and section 3. Wavelet Based MC-CDMA, and see equation (6) where the wavelet ψ spread spectrum modulation takes place (see second term of equation (6) the wavelet function) and Fig. 1 the plurality of second mixers of the bottom portion (associated with bm) see also left column second paragraph from the end on page 1445 discussing orthognality)

At the time of the invention, it would have been obvious to a person skilled in the art at the time of the invention, to modify the method of Hara et. al., based on the teachings of Changet. al., so that frequency division adjacent individually spread-spectrum modulated orthogonal frequency division multiplexed carriers are spread-spectrum modulated by at least one member selected from the group consisting of mutually orthogonal Fourier codes and mutually orthogonal wavelet codes (see the mutually orthogonal wavelet codes of Chang et. al.) and the motivation for performing such a modification is the ability to combat distortion in fading channels (see left column on page 1446, paragraph following equation (15))

With respect to claim 17, all of the limitations of claim 17, are analyzed above in claim 12, but Hara et. al, do not expressly teach: wherein frequency division adjacent individually spread-spectrum modulated orthogonal frequency division multiplexed carriers are spread-spectrum demodulated by at least one member selected from the

group consisting of mutually orthogonal Fourier codes and mutually orthogonal wavelet codes.

In the same field of endeavor, Chang et. al. disclose: spread-spectrum demodulated by at least one member selected from the group consisting of mutually orthogonal Fourier codes and mutually orthogonal wavelet codes (see page 1444, left column, see the discussion of the receiver using the mutually orthogonal wavelets, approximately third bottom of the column, continuing to the right column of page 1444, see section below equation (8) use of matched filter corresponding to ψ wavelet to demodulate the received signal, and see left column approximately lower half of column, discussing demodulation using the matched filter).

At the time of the invention, it would have been obvious to a person skilled in the art at the time of the invention, to modify the method of Hara et. al., based on the teachings of Chang et. al., so that frequency division adjacent individually spread-spectrum modulated orthogonal frequency division multiplexed carriers are spread-spectrum demodulated by at least one member selected from the group consisting of mutually orthogonal Fourier codes and mutually orthogonal wavelet codes (see the mutually orthogonal wavelet codes of Chang et. al.) and the motivation for performing such a modification is the ability to combat distortion in fading channels (see left column on page 1446, paragraph following equation (15)).

18. Claims 10-11, 20-21, 24-26, 28-29, 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et. al. "Overview of Multicarrier CDMA".

With respect to claim 10, all of the limitations of claim 10 are analyzed above in claim 1, but Hara et. al., do not expressly teach: a computer program, comprising computer or machine readable program elements translatable for implementing the method of claim 1. At the time of the invention, it would have been obvious to a person skilled in the art, to implement the method of claim 1, (as taught by Hara et. al.,) in a computer program, comprising computer program elements translatable for implementing the method of claim 1. The benefit of implementing the method of Hara et. al., in a computer program, comprising computer program elements include: ability to troubleshoot, easily, upgrade/modify (without buying expensive components), easy data storage/processing and user interface for monitoring the process.

With respect to claim 11, all of the limitations of claim 11, are analyzed above in claim 1, except for: an electronic media, comprising a program for performing the method of claim 1. At the time of the invention, it would have been obvious to a person skilled in the art, to implement the method of claim 1, (as taught by Hara et. al.,) in a an electronic media, comprising a program, for performing the method of claim 1. The benefit of implementing the method of Hara et. al., in a an electronic media, comprising a program include: ability to troubleshoot, easily, upgrade/modify (without buying expensive components), easy data storage/processing and user interface for monitoring the process.

With respect to claims 20, and 21, the basis limitations of these claims are analyzed above in claim 12, and claims 20 and 21, are rejected using a rationale similar to the one used in the rejection of claims 10 and 11 respectively.

With respect to claim 24, all of the limitations of claim 24 are analyzed above in claim 22 but Hara et. al., do not expressly teach: an integrated circuit comprising the apparatus of claim 22. However, at the time of the invention, it would have been obvious to a person skilled in the art, to implement the apparatus of claim 22, and the benefit of doing so includes for example miniaturization of components, standardization & mass production (reliability and availability).

With respect to claim 25, all of the limitations of claim 26, are analyzed above in claim 25 but Hara et. al., do not expressly teach: a circuit board, comprising the integrated circuit of claim 24. At the time of the invention, it would have been obvious to a person skilled in the art to place the IC (chip) of Hara et. al., (which is part of an MC-CDMA transmitter) on a circuit board (circuit board is populated) (connected with other components (chips)) and using circuit board which comprises the integrated chip of Hara et. al. allows the easy addition /removal/replacement of integrated chips, as well provide a durable non-conducting mounting surface for the IC.

With respect to claim 26, all of the limitations of claim 26 are analyzed above in claim 25 (Hara et.al., discloses a transmitter in Fig. 2(a)).

With respect to claim 28, all of the limitations of claim 28, are analyzed above in claim 27, but Hara et. al. do not expressly teach: wherein each of the demodulator/despreader circuits and the associated low-pass filters composes a digital signal processor. At the time of the invention, it would have been obvious to a person skilled in the art to modify the system of Hara et. al., by implementing the demodulator/despreader circuits and the associated low-pass filters as a digital signal processor, and the benefit of implementing the demodulator/despreader circuits and the associated low-pass filters as a DSP include high speed operation and real time processing.

With respect to claim 29, all of the limitations of claim 29, are analyzed above in claim 28, except for: further comprising an analog-to-digital converter coupled to the digital signal processor. At the time of the invention, it would have been obvious to a person skilled in the art to couple an analog-to-digital converter to the digital signal processor, and the motivation of coupling an analog-to-digital converter to the digital signal processor is the conversion of analog data into digital data and this is necessary in order for the DSP (digital signal processor – processes digital data) to process data.

With respect to claims 31-32 these claims are rejected under a rational similar to the one used to reject claims 23-24 above.

With respect to claim 33, all of the limitations of claim 33, are analyzed above in claim 32, and Hara et. al., disclose: a receiver, comprising the circuit board of claim 32 (see Fig. 2(c) a receiver).

19. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et. al. “Overview of Multicarrier CDMA”, IEEE in view of Dent (U.S. 6,680,928).

With respect to claim 23, all of the limitations of claim 23, are analyzed above in claim 22, but Hara et. al does not expressly teach: further comprising a radio-frequency power amplifier coupled to the linear summer and an antenna coupled to the radio-frequency power amplifier.

In the same field of endeavor, Dent discloses: a radio-frequency power amplifier coupled to the linear summer and an antenna coupled to the radio-frequency power amplifier (Fig. 1, element 32, PA (power amplifier) coupled to the summer 24, and Antenna 34, coupled to the PA).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the system (transmitter of Hara et. al.,) by incorporating a radio-frequency power amplifier coupled to the linear summer and an antenna coupled to the radio-frequency power amplifier as taught by Dent, and the benefit of the above modification would be to amplify the signal output from the adder to a desired power level (see

column 4 of Dent, lines 54-56, where the amplifier amplifies the modulated signal (after the adder) to a desired level) and the benefit of coupling an antenna radio-frequency power amplifier is that an antenna is the element that allows the actual transmision/radiation of the generated signal (and this is very well known in the art).

20. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et. al. "Overview of Multicarrier CDMA", IEEE in view of Kim (U.S. 6,035,008).

With respect to claim 30, all of the limitations of claim 30 are analyzed above in claim 27, but Hara et. al., does not expressly teach: further comprising an intermediate-frequency amplifier chain coupled to the plurality of demodulator/despreader circuits; an intermediate-frequency bandpass filter coupled to the intermediate-frequency amplifier chain; a radio-frequency downconverter coupled to the intermediate-frequency bandpass filter; a low-noise radio-frequency amplifier coupled to the radio-frequency downconverter; and an antenna coupled to the low-noise radio-frequency amplifier.

In the same field of endeavor, Kim discloses: an intermediate-frequency amplifier chain coupled to the plurality of demodulator/despreader circuits (Fig. 2, element 36 , IF amplifier since mixer 32 , converts the received (RF) signa into an RF signal, seecolumn 6, lines 38-41, and column 4, lines 55-67 for description of Fig. 2, and as part of the spread spectrum receiver, the IF amplifer is coupled to a plurality of demodulator/despreader circuits that are also par of the receiver); an intermediate-frequency bandpass filter coupled to the intermediate-frequency amplifier chain (Fig. 2 BPF 34); a radio-frequency downconverter coupled to the intermediate-frequency

bandpass filter (Fig. 2, function of mixer 32 , LPF 44, and LO 30, that convert the received (RF) signal into IF ie. down-convert it); a low-noise radio-frequency amplifier coupled to the radio-frequency downconverter (see Fig. 2, element 26, LNA); and an antenna coupled to the low-noise radio-frequency amplifier (Fig. 2, antenna 20).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the system of Hara et. al. (only show the demodulators/depsreaders of the spread sprectrum receiver) by coupling to it, an intermediate-frequency amplifier chain; an intermediate-frequency bandpass filter coupled to the intermediate-frequency amplifier chain; a radio-frequency downconverter coupled to the intermediate-frequency bandpass filter; a low-noise radio-frequency amplifier coupled to the radio-frequency downconverter and an antenna coupled to the low-noise radio-frequency amplifier, as taught by Kim and the motivation for the above modification is that the system of Kim comprise a wireless receiver front-end that provides automatic gain control for finely controlling a gain of a received signal, prevents deterioration of the system, when the power of the received signal is too high, removes second and third harmonics of a local oscillator (see Kim, column 2,lines 34-46, listing some of the features of the invention).

Conclusion

31. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yoon et. al. (U.S. 6,834, 047)

Inogai (U.S. 2004/0114671).

Wu et. al. (U.S 7,1616,927)

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SOPHIA VLAHOS whose telephone number is 571 272 5507. The examiner can normally be reached on MTWRF 8:30-17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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SV
1/2/2007

M. G.
MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER